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On the Positions of the Radcliffe Catalogue. By T. H. Safford, Assistant at the Observatory of Harvard College.

(*Communicated by Prof. Bond.*)

The differences given by the editor, the Rev. R. Main (*Radcliffe Catalogue*, p. v.) between the *Radcliffe* and the *Twelve-Year Catalogue*, can be approximately represented by the following formula:—

$$\text{Diff. of R.A. (Green. 12-Year C.} - \text{Rad.)} = -0^{s}\cdot038 + 0^{s}\cdot032 \sin (a + 5^{h}\,32^{m}),$$

where a is the Right Ascension.

The remaining discrepancies are

R.A. (Form.—Obs.) h	s	R.A. (Form.—Obs.) h	s	R.A. (Form.—Obs.) h	s
0	−0·006	8	−0·004	16	−0·004
1	−0·007	9	−0·011	17	−0·016
2	+0·050	10	+0·024	18	−0·008
3	+0·024	11	+0·021	19	−0·009
4	−0·032	12	+0·030	20	+0·008
5	−0·030	13	+0·011	21	+0·005
6	−0·018	14	+0·004	22	0·000
7	−0·017	15	−0·030	23	+0·013

These remaining differences, although in some instances large, do yet change sign very frequently, and it will be observed that their mean between 10^{h} and 15^{h} is only $+0^{s}\cdot010$, whereas the mean of the original discrepancies deduced by Mr. Main between the same limits was $0^{s}\cdot05$ after subtracting the difference ($0^{s}\cdot038$) of equinoxes.

In investigating the causes which would give rise to such systematic discrepancies, I was first struck with the fact that

the same, or nearly the same, variations were apparent in the assumed places of the time-stars, for years since 1845; that, if correct positions of time-stars had been assumed, the resulting positions would have been free from these small errors.

To prove this it is only necessary to adduce the comparisons made.

Denoting by A the positions (for Radcliffe time-stars) of the *Twelve-Year Catalogue* for 1845; by B, the assumed places for the same year (*Radcliffe Observations*, vol. vi. p. vii.) of the same stars; and by C, the results of that year's observations at the Radcliffe Observatory, we have on the average:—

Hours of R.A.	B—A.	C—B.	C—A.	No. Stars.	No. Obs.
0 to 9	+0·019	—0·002	+0·017	43	174
10 ,, 15	+0·074	—0·000	+0·064	15	62
16 ,, 23	+0·023	—0·001	+0·025	36	118

The weights given to the numbers in the second and third columns only, are proportional to the number of observations. The discrepancy is apparent enough, but it is nearly the same in C as B; showing that the observations of 1845 neither increased nor diminished to any sensible amount the discrepancy which already existed in the places of the time-stars. There is a slight casual non-agreement between (B — A) + (C — B) and (C — A), owing to the different weights allowed.

So far as the second column (C—B) is concerned, a similar investigation showed much the same results for every year between 1840 and 1844. The year 1840, it is true, gave a value of about $+0^{s}\cdot015$ between 10^{h} and 15^{h} for C—B. This probably contributed somewhat to the variations apparent in the time-stars of the following years, but a similar amount did not again appear; but the *Nautical Almanac* places for 1840, compared with the *Twelve-Year Catalogue* places for the same year, exhibit the following differences in the mean:—

Hours.	B—A.
0 to 9	+0·077
10 ,, 15	+0·093
16 ,, 23	+0·083

This, so far as it is not constant, is entirely owing to the proper motions of the *Nautical Almanac* stars, which were generally neglected until 1848.

These yearly proper motions are, on the average (making that of stars for which they were taken into account in 1840 = 0):—

Hours.	s
0 to 9	+0·004
10 ,, 15	+0·001
16 ,, 23	+0·004

so that this error, which is contained in the Radcliffe time-stars, may have increased the variations in question.

In fact there is a tendency, in all proper motions in R.A., to be less (positively) between $10^h - 15^h$, or about these limits, than for other right ascensions; so that, not only the places of *Nautical-Almanac* stars, but those of other stars, will be somewhat erroneous, systematically, in this way, if computed without proper motion.

But why can errors of this kind remain, as we have seen that they do, in the results of observations? It would seem that they must be diminished by observing many stars together, and correcting their right ascensions mutually.

Suppose that N time-stars are observed in one day; that their right ascensions are a, $a + \beta$, $a + \beta'$, &c., and that these stars are equally used for the clock-errors. If a discrepancy of the form

$$m + n \sin a + p \cos a$$

exist, its effect upon the clock-errors for that day will be

$$m + \frac{n \{\sin a + \sin (a + \beta) + \sin (a + \beta') + \&c.\}}{N}$$

$$+ p \frac{\{\cos a + \cos (a + \beta) + \cos (a + \beta') + \&c.\}}{N};$$

or, expanding

$$m + n \sin a \frac{(1 + \cos \beta + \cos \beta' + \&c.)}{N}$$

$$+ p \cos a \frac{(1 + \cos \beta + \cos \beta' + \&c.)}{N}$$

$$- p \sin a \frac{(\sin \beta + \sin \beta' + \&c.)}{N}$$

$$+ n \cos a \frac{(\sin \beta + \sin \beta' + \&c.)}{N};$$

and this will be a resulting error in the observed place, for that night, of the star whose right ascension is a.

Let the same star be observed again, in other groups. The mean of all the quantities represented by $\sin \beta$ will be very nearly $= 0$; because every time-star will be compared with many stars on each side of it, so that many of the quantities represented by β will be positive, and many negative.

But, on the other hand, if β be always small (less than

6 hours in almost all cases), the value of its cosine will be positive, and that of $\frac{1 + \cos\beta + \cos\beta' + \&c.}{N}$ will be nearly $= 1$, including, as it must, many instances in which the stars compared are within an hour or two of each other.

The effect of this will be (as we have seen in the *Radcliffe Observations*) to perpetuate any small systematic discrepancy of this kind.

But systematic differences depending on the declination tend to destroy themselves, unless the form of the pivots of the transit-instrument be erroneous.

I am, however, disposed to lay most stress upon the observed fact that the results of the *Radcliffe Observations* do, so far as the discrepancy in question is concerned, agree essentially with the assumed places of time-stars.

Hence it does not seem probable that the discrepancies in question have arisen from any instrumental error or error of observation, at least to the amount which they have reached.

Mr. Auwers, of Königsberg, has given (*Astr. Nachr.*, No. 1300) the following formula for correcting the Radcliffe *declinations*, so as to make them agree with Wolfers' *Tabulæ Reductionum*:—

$$\Delta\delta = -4''{\cdot}27 + 0''{\cdot}0647\,\delta^{\circ}.$$

I have tabulated these values with changed sign, so as to make them apply to N.P.D., and placed opposite them Mr. Johnson's own corrections:—

N.P.D.	Formula, Auwers.	Mr. Johnson's Correction.
°	″	″
0	−1·55	+0·92
10	−0·91	+1·03
20	−0·26	+1·15
30	+0·39	+1·28
40	+1·04	+1·38
50	+1·68	+1·46

These differ largely, and it is perhaps doubtful whether Mr. Auwers intended his formula to apply within 30° N.P.D. On the other hand, Wolfers' investigation (*Astr. Nachr.*, No. 1181) shows a general agreement between the Radcliffe *corrected* places and his own declinations.

Ephemeris of Encke's Comet. Calculated by Prof. Encke, and Communicated by the Astronomer Royal.

(For Berlin Mean Noon.)

1861.	R.A. h m s	Decl. ° ′ ″	Log Δ.	Log r.
Oct. 3	0 22 35·05	+18 59 53·1	0·044417	0·319852
4	20 13·79	53 28·2	0·040352	0·317687
5	17 50·40	46 36·7	0·036381	0·315502
6	15 25·01	39 18·6	0·032507	0·313295
7	12 57·78	31 34·1	0·028732	0·311067
8	10 28·85	23 23·0	0·025061	0·308817
9	7 58·39	14 45·7	0·021497	0·306544
10	5 26·55	+18 5 42·2	0·018043	0·304249
11	2 53·53	+17 56 13·1	0·014701	0·301931
12	0 0 19·47	46 18·6	0·011474	0·299589
13	23 57 44·57	35 59·2	0·008365	0·297224
14	55 8·99	25 15·5	0·005375	0·294834
15	52 32·93	14 8·2	0·002507	0·292420
16	49 56·57	+17 2 37·8	9·999761	0·289980
17	47 20·09	+16 50 45·3	9·997139	0·287515
18	44 43·67	38 31·3	9·994642	0·285023
19	42 7·51	25 56·9	9·992271	0·282505
20	39 31·78	+16 13 3·0	9·990026	0·279960
21	36 56·67	+15 59 50·6	9·987906	0·277388
22	34 22·37	46 20·9	9·985913	0·274787
23	31 49·07	32 35·1	9·984045	0·272158
24	29 16·95	18 34·4	9·982301	0·269500
25	26 46·18	+15 4 20·1	9·980681	0·266812
26	24 16·92	+14 49 53·5	9·979182	0·264093
27	21 49·35	35 16·1	9·977803	0·261344
28	19 23·63	20 29·1	9·976542	0·258564
29	16 59·90	+14 5 34·1	9·975395	0·255571
30	14 38·31	+13 50 32·4	9·974361	0·252906
31	12 19·01	35 25·5	9·973435	0·250027
Nov. 1	10 2·13	20 14·8	9·972615	0·247114
2	7 47·80	+13 5 1·7	9·971897	0·244167
3	5 36·14	+12 49 47·5	9·971276	0·241184
4	3 27·24	34 33·7	9·970748	0·238164
5	23 1 21·21	19 21·7	9·970309	0·235107
6	22 59 18·11	+12 4 12·6	9·969955	0·232013
7	57 18·00	+11 49 7·7	9·969680	0·228880
8	55 20·96	34 8·0	9·969479	0·225708
9	22 53 27·05	+11 19 14·5	9·969341	0·222495

1861.	R.A. h m s	Decl. ° ′ ″	Log Δ.	Log r.
Nov. 10	22 51 36·31	+11 4 28·3	9·969281	0·219240
11	49 48·79	+10 49 50·6	9·969273	0·215943
12	48 4·51	35 22·2	9·969320	0·212603
13	46 23·48	21 4·0	9·969415	0·209219
14	44 45·71	+10 6 56·8	9·969555	0·205790
15	43 11·21	+ 9 53 1·3	9·969734	0·202314
16	41 39·97	39 18·0	9·969947	0·198791
17	40 12·00	25 47·6	9·970189	0·195219
18	38 47·28	+ 9 12 30·5	9·970456	0·191598
19	37 25·80	+ 8 59 27·2	9·970743	0·187926
20	36 7·55	46 38·2	9·971044	0·184201
21	34 52·49	34 3·9	9·971355	0·180423
22	33 40·61	21 44·6	9·971672	0·176589
23	32 31·87	+ 8 9 40·6	9·971990	0·172699
24	31 26·23	+ 7 57 52·2	9·972304	0·168751
25	30 23·67	46 19·6	9·972609	0·164744
26	29 24·14	35 3·0	9·972902	0·160675
27	28 27·59	24 2·7	9·973177	0·156544
28	27 33·98	13 18·5	9·973432	0·152349
29	26 43·26	+ 7 2 50·5	9·973660	0·148088
30	25 55·37	+ 6 52 38·7	9·973857	0·143758
Dec. 1	25 10·25	42 42·9	9·974020	0·139358
2	24 27·85	33 3·0	9·974144	0·134886
3	23 48·10	23 39·0	9·974224	0·130340
4	23 10·93	14 30·7	9·974257	0·125718
5	22 36·27	+ 6 5 37·8	9·974239	0·121018
6	22 4·05	+ 5 57 0·1	9·974163	0·116236
7	21 34·18	48 37·2	9·974028	0·111371
8	21 6·59	40 28·8	9·973829	0·106419
9	20 41·19	32 34·3	9·973562	0·101379
10	20 17·89	24 53·4	9·973224	0·096247
11	19 56·61	17 25·7	9·972811	0·091020
12	19 37·25	10 10·5	9·972319	0·085696
13	19 19·73	+ 5 3 7·2	9·971744	0·080271
14	19 3·95	+ 4 56 15·2	9·971083	0·074741
15	18 49·82	49 33·8	9·970331	0·069104
16	18 37·23	43 2·4	9·969486	0·063355
17	18 26·08	36 40·2	9·968543	0·057490
18	18 16·26	30 26·3	9·967498	0·051506
19	18 7·68	24 19·9	9·966349	0·045398
20	18 0·23	18 20·1	9·965088	0·039161
21	17 53·79	12 26·2	9·963714	0·032791
22	22 17 48·23	+4 6 36·9	9·962223	0·026282

1861.	R.A. h m s	Decl. ° ′ ″	Log Δ.	Log *r*.
Dec. 23	22 17 43·42	+ 4 0 51·1	9·960610	0·019630
24	17 39·22	+ 3 55 7·4	9·958870	0·012828
25	17 35·46	49 24·8	9·956999	0·005872
26	17 31·99	43 41·6	9·954992	9·998754
27	17 28·66	37 56·5	9·952845	9·991470
28	17 25·29	32 7·8	9·950553	9·984011
29	17 21·69	26 13·7	9·948110	9·976371
30	17 17·64	20 12·0	9·945512	9·968543
31	22 17 12·90	+ 3 14 0·1	9·942752	9·960517
1862.				
Jan. 1	22 17 7·22	7 35·8	9·939826	9·952287
2	17 0·33	+ 3 0 56·7	9·936727	9·943843
3	16 51·96	+ 2 53 59·4	9·933452	9·935177
4	16 41·73	46 40·4	9·929993	9·926279
5	16 29·28	38 55·9	9·926346	9·917138
6	16 14·25	30 42·0	9·922506	9·907744
7	15 56·23	21 54·3	9·918468	9·898088
8	15 34·72	12 27·6	9·914227	9·888158
9	15 9·19	+ 2 2 15·9	9·909780	9·877942
10	14 39·08	+ 1 51 13·1	9·905123	9·867429
11	14 3·78	1 39 12·2	9·900254	9·856605
12	13 22·60	1 26 5·3	9·895173	9·845459
13	12 34·78	1 11 43·5	9·889880	9·833982
14	11 39·45	0 55 57·0	9·884376	9·822160
15	10 35·62	0 38 34·9	9·878665	9·809979
16	9 22·25	+ 0 19 25·1	9·872759	9·797434
17	7 58.22	− 0 1 45·9	9·866673	9·784517
18	6 22·30	0 25 12·4	9·860427	9·771224
19	4 33·19	0 51 10·9	9·854045	9·757552
20	2 29·43	1 19 58·8	9·847563	9·743504
21	22 0 9·44	1 51 54·8	9·841029	9·729091
22	21 57 31·62	2 27 18·2	9·834500	9·714331
23	54 34·39	3 6 29·1	9·828055	9·699255
24	51 16·21	3 49 47·1	9·821789	9·683909
25	47 35·62	4 37 29·3	9·815818	9·668353
26	43 31·43	− 5 29 50·6	9·810283	9·652686
27	39 2·96	6 26 59·4	9·805347	9·637011
28	34 10·13	7 28 56·3	9·801202	9·621484
29	28 53·80	8 35 30·7	9·798055	9·606292
30	23 16·07	9 46 18·1	9·796119	9·591673
31	17 20·34	11 0 37·3	9·795613	9·577897
Feb. 1	11 11·67	12 17 30·1	9·796724	9·565284
2	21 4 56·87	13 35 40·9	9·799611	9·554178
3	20 58 43·64	−14 53 45·1	9·804343	9·544931

1869.	R.A. h m s	Decl. ° ′ ″	Log Δ.	Log *r*.
Feb. 4	20 52 40·93	−16 10 11·2	9·810924	9·537878
5	46 57·94	17 23 29·7	9·819265	9·533303
6	41 42·87	18 32 23·6	9·829186	9·531399
7	37 2·66	19 35 53·2	9·840441	9·532254
8	33 2·33	20 33 18·8	9·852742	9·535827
9	29 44·52	21 24 23·3	9·865784	9·541967
10	27 9·75	22 9 7·3	9·879280	9·550414
11	25 16·66	22 47 45·7	9·892977	9·560853
12	24 2·54	23 20 43·5	9·906654	9·572933
13	23 23·86	23 48 30·0	9·920146	9·586304
14	23 16·54	24 11 38·1	9·933327	9·600637
15	23 36·57	−24 30 39·9	9·946111	9·615640
16	24 19·94	46 5·4	9·958442	9·631064
17	25 23·08	24 58 21·8	6·970288	9·646703
18	26 42·66	25 7 54·1	9·981637	9·662392
19	28 15·86	15 4·0	9·992488	9·678001
20	30 0·17	20 10·7	0·002849	9·693434
21	31 53·51	23 30·2	0·012736	9·708618
22	33 54·11	25 16·6	0·022169	9·723503
23	36 0·41	25 42·5	0·031168	9·738051
24	38 11·09	24 58·6	0·039752	9·752240
25	40 25·09	23 14·1	0·047944	9·766056
26	42 41·51	20 36·9	0·055766	9·779494
27	44 59·61	17 13·7	0·063237	9·792554
28	47 18·79	13 10·2	0·070377	9·805242
Mar. 1	49 38·49	8 31·8	0·077203	9·817560
2	51 58·24	−25 3 23·4	0·083733	9·829517
3	54 17·73	−24 57 48·6	0·089982	9·841123
4	56 36·69	51 50·7	0·095968	9·852393
5	20 58 54·85	45 33·0	0·101702	9·863337
6	21 1 11·99	38 58·3	0·107199	9·873968
7	3 27·93	32 8·9	0·112469	9·884298
8	5 42·59	25 6·7	0·117525	9·894337
9	7 55·83	17 53·6	0·122377	9·904096
10	10 7·55	10 31·5	0·127034	9·913588
11	12 17·69	−24 3 1·7	0·131504	9·922823
12	14 26·20	−23 55 25·6	0·135797	9·931812
13	16 33·03	47 44·4	0·139920	9·940566
14	18 38·15	39 59·2	0·143880	9·949094
15	20 41·53	32 10·9	0·147684	9·957404
16	22 43·16	24 20·4	0·151338	9·965507
17	24 43·04	16 28·5	0·154848	9·973410
18	26 41·14	8 36·0	0·158219	9·981121

1862.	R.A. h m s	Decl. ° ′ ″	Log Δ.	Log *r*.
Mar. 19	21 28 37·48	−23 0 43·6	0·161455	9·988648
20	30 32·05	−22 52 51·8	0·164562	9·995998
21	32 24·86	45 1·3	0·167544	0·003178
22	34 15·90	37 12·6	0·170406	0·010195
23	36 5·19	29 26·2	0·173150	0·017054
24	37 52·73	21 42·6	0·175781	0·023762
25	39 38·52	14 2·2	0·178302	0·030325
26	41 22·58	−22 6 25·2	0·180717	0·036748
27	43 4·91	−21 58 52·0	0·183028	0·043035
28	44 45·51	51 23·2	0·185239	0·049192
29	46 24·39	43 59·0	0·187352	0·055223
30	48 1·57	36 39·7	0·189370	0·061133
31	49 37·06	29 25·6	0·191296	0·066926
April 1	51 10·86	22 16·8	0·193132	0·072605
2	52 42·99	15 13·7	0·194881	0·078176
3	54 13·45	8 16·5	0·196545	0·083641
4	55 42·25	−21 1 25·4	0·198125	0·089003
5	57 9·40	−20 54 40·6	0·199624	0·094266
6	58 34·92	48 2·3	0·201044	0·099434
7	21 59 58·80	41 30·6	0·202386	0·104508
8	22 1 21·07	35 5·6	0·203653	0·109493
9	2 41·73	28 47·6	0·204847	0·114391
10	4 0·79	22 36·6	0·205969	0·119204
11	5 18·25	16 32·8	0·207021	0·123935
12	6 34·12	10 36·4	0·208004	0·128587
13	7 48·42	−20 4 47·6	0·208919	0·133161
14	9 1·14	−19 59 6·4	0·209767	0·137661
15	10 12·30	53 33·0	0·210550	0·142088
16	22 11 21·89	−19 48 7·6	0·211268	0·146445

Elements.

Epoch, 1862, Feb. 6, 20 Berlin.

L =	158 ° 1 ′ 0 ″	Mean longitude.
M =	0 0 10	Mean anomaly.
ϖ =	158 0 50	Long. of perih. } Mean Eq.
Ω =	334 30 50	Long. of node. } Feb. 6.
i =	13 5 0	Inclination.
φ =	57 57 20	Angle of excentricity.
n =	1074″·625	Mean diurnal motion.
Log. a =	0·3458331	

Observations of Comet II., 1861, *at the Sydney Observatory.*
By W. Scott, Esq., Astronomer for New South Wales.

I send herewith some observations of a very fine comet discovered on the 13th of May by Mr. Tebbutt, a young Australian farmer and self-taught astronomer. Mr. Tebbutt communicated his discovery to me on the 21st, but I was unable to obtain any observations of any value until the 27th and 30th, when the comet was just visible after sunset to the naked eye. The observations were made with Sir T. Brisbane's old equatoreal with a ring-micrometer.

An equatoreal telescope with 7-inch object-glass by Merz and Son, having arrived, I succeeded in getting it mounted on the 4th of June, and on the morning of the 8th obtained the first observations with it of the comet, which was then plainly visible to the naked eye.

The comet is now sufficiently brilliant to be seen without a telescope 40 minutes before sunrise; its tail extends 18° in a direction 15° W. of South, one narrow stream of light extending twice as far as the rest of the tail. The nucleus is distinct and round, presenting no remarkable features.

Unfortunately, the Time Ball Tower, to which such undue prominence was given in the building of the Observatory, prevents me from observing with the new instrument until a few minutes before the increasing daylight renders the comet invisible; consequently, I have been compelled to make the last two days' observations with the old instrument mounted in a window on the east side of the building.

The possession of a first-class telescope will enable me now to commence a work which I have long contemplated, namely, the reobservation of Sir J. Herschel's double stars.

Greenwich Mean Time.		Star.	R.A. Comet — Star.	(North +) Decl. Comet — Star.
d	h m s		m s	′ ″
May 26	20 1 40	B.A.C. 1250	+1 21·5	*
	9 26		20·6	+11 34
	13 54		21·3	*
	18 42		20·5	11 41
	28 12		21·8	11 37
29	20 7 3	B.A.C. 1250	+2 9·3	+21 30
	12 36		10·4	21 43
June 8	6 56 22	Star of 8th magnitude. Approximate R.A. $3^h\ 59^m\ 5^s$ Decl. $-28°\ 43'\ 15''$	+2 28·7	−8 33
	7 0 35		28·9	29
	6 42		28·9	28
	11 19		29·4	24
	18 19		29·1	22

* Too near the diameter of the ring to be depended on for declination.

Greenwich Mean Time.		Star.	R.A. Comet — Star.	(North +) Decl. Comet — Star.
d	h m s		m s	′ ″
June 10	6 46 8	B.A.C. 1273	+3 19·1	−6 25
	51 56		19·2	11
	7 3 59		19·6	5 55
	9 16		20·0	6 6

B.A.C. 1273 has been observed four times with the meridian circle in 1859 and 1860.

Its tabular position requires correction + 0ˢ·3 in R.A.
... ... + 0″·7 in N.P.D.

None of the other stars have been observed here on the meridian.

d	h m s		m s	′ ″
June 11	6 3 4	Star of 7th magnitude. Approximate R.A. 4ʰ 1ᵐ 39ˢ Decl. −27° 47′ 23″	+2 29·6	+4 57
	7 29		29·8	5 18
	11 29		30·0	23
	15 31		29·9	22
	19 40		30·3	30
	23 37		30·4	34
	27 32		30·5	46
14	6 4 40	B.A.C. 1355	−7 50·9	+9 18
	15 3		50·1	42
	25 10		48·6	59
15	6 1 2	Lacaille 1431	−7 46·1	+6 33
	10 58		45·8	7 2
	20 7		44·3	7 20
	37 10		43·9	7 24
16	5 55 29	Lacaille 1379	+4 27·3	−0 11
	6 2 8		27·8	+0 11
	8 21		28·3	17
	15 25		29·0	37
	21 39		29·1	48
17	5 35 37	B.A.C. 1334	+0 45·6	+11 35
	38 31		46·3	51
	41 9		46·2	49
	46 43		47·8	12 11
	48 35		47·4	22
	51 24		47·8	26
	53 46		49·7	28
	56 59		48·6	31
	6 1 23		49·0	54
	5 27		47·3	13 3

Greenwich Mean Time.	Star.	R.A. Comet—Star.	(North +) Decl. Comet—Star.
d h m s		m s	′ ″
June 20 7 47 52	Star of 7th magnitude. Approximate R.A. $4^h\ 23^m\ 15^s$ Decl. $-18°\ 46'\ 30''$	−0 35·3	+25 22
52 16		34·0	42
55 38		33·4	26 7
58 33		33·7	20
8 1 46		33·5	36
5 7		32·8	52
8 6		32·4	27 5
11 53		31·7	24

The Longitude of the Sydney Observatory is $10^h\ 5^m\ 0^s$
Assumed Latitude ... ... $-33°\ 51'\ 41''$

Observatory, Sydney, June 21st, 1861.

A later communication has been received, as follows:—

The accompanying observations are corrected for refraction and proper motion. There is some reason to believe that the assumed longitude of the observatory is 10^s too large, being deduced from Moon Culminations and the *Nautical Almanac* tables for 1859-60. It may, therefore, be desirable to add 10^s to the Greenwich mean times of observation.

Greenwich M.T.	Star.	Com.—Star. R.A.	Log. Factor for Parallax.	(North +) Com.—Star. Decl.	Log. Factor for Parallax.
d h m s		s		′ ″	
June 22 8 28 40	Weisse, IV. 655	− 10·6	8·68487	−4 12	9·64134
31 23		10·5	8·68167	3 52	9·63923
33 29		10·2	8·67905	3 38	9·63796
35 49		− 9·7	8·67614	−3 17	9·63634
23 8 5 28	8th mag. Approx. Pos. R.A. $4^h\ 37^m\ 40^s$ Decl. $-10°\ 12'$	− 47·0	8·70648	+5 31	9·68390
8 31		45·9	8·70368	5 46	9·68278
11 19		44·8	8·70100	6 12	9·68094
13 59		44·2	8·69840	6 30	9·67963
16 29		43·5	8·69585	6 51	9·67842
18 51		− 42·9	8·69347	+7 16	9·67711
25 7 40 31	Lalande, 9458.	−1 45·1	8·72402	+0 22	9·74049
45 55		42·9	8·72063	1 42	9·74032
49 3		41·5	8·71866	2 21	9·74026
52 15		40·6	8·71649	3 18	9·74018
57 39		38·2	8·71262	4 19	9·74001
8 0 55		37·0	8·71015	5 10	9·73997
4 32		− 35·4	8·70724	+6 5	9·73992

Greenwich M.T.	Star.	Com.—Star. R.A.	Log. Factor for Parallax.	(North +) Com.—Star. Decl.	Log. Factor for Parallax.
d h m s		s		′ ″	
June 26 7 46 24	Lalande, 9757.	— 32·2	8·72784	+4 51	9·75908
49 20		30·7	8·72618	5 47	9·75990
56 37		27·5	8·72170	8 7	9·76187
59 6		25·7	8·72008	8 45	9·76257
8 1 38		24·9	8·71836	+9 30	9·76323

The following orbit, computed by Mr. Hawkins of Goulburn, agrees very closely with the observed positions:—

Perihelion Passage, Greenwich Mean Time, June	d 11·75008
Perihelion Distance	0·822152
Longitude of Node	° ′ ″ 279 1 41
Inclination	85 37 46
Distance of Node from Perihelion	29 38 59
Heliocentric Motion	Direct.

Observatory, Sydney, August 11, 1861.

Observations of Comet II., 1861, *made at the Dudley Observatory, Albany, U.S.A.* By G. W. Hough, Assistant.

(*Communicated by Professor Mitchell through the Astronomer Royal.*)

1861.	M.T. Dudley Observatory. h m s	App. R.A. h m s	App. Decl. ° ′ ″
July 3	15 21 8·75	10 10 27·02	+66 33 2·82
5	13 39 8·37	12 0 12·54	65 58 6·92
7	11 22 30·00	13 1 53·67	63 7 51·90
12	11 0 41·50	14 7 46·17	56 58 22·76
18	9 6 23·86	14 35 6·21	52 42 33·05
21	15 33 13·70	14 43 26·60	51 10 38·40
23	11 53 46·64	14 47 9·63	50 27 56·72
25	9 42 52·04	14 50 31·27	49 48 51·23
30	11 9 55·95	14 57 53·45	48 23 20·54
Aug. 3	10 30 17·56	15 2 47·41	+47 29 14·87

July 3. Observed with the Olcott Meridian Circle at the lower Culmination. Fifteen wires observed in R.A. The remaining observations were made with the Equatoreal. The diff. in R.A. between the Comet and Comparison Star was determined by recording their transits (across three wires of the micrometer) in the Chronograph.

	Comp. Stars.	Comp.
July 5.	22785 L. L., 12372 Arg.	3
7.	24511 L. L., 13387 Arg.	3
12.	14403 Arg.	3
18.	14785 Arg.	3
21.	14869 Arg.	3
23.	14884 Arg., 4134 Rümker	3

	Comp. Star.	Comp.
July 25.	14971 Arg., 4878 Rümker	4
30.	4922 and 4930 Rümker	6
Aug. 1.	4961 Rümker	5

The observations are not corrected for parallax.

And with the foregoing observations Prof. Mitchell also communicated—

Approximate Elements of Comet II. 1861.

1861, Washington M.T. June 11·668.

$\pi = 249\ 37'7$
$\Omega = 278\ 58'1$ } App. Eq., July 3^{d}·0
$i = 85\ 23'7$
Log q = 9·916390.

Direct.

From observations of July 3, 12, and 25.

Observations of Comet II. 1861, *with the Equatoreal, at the United States Naval Observatory, Washington.* By Mr. James Ferguson, Assistant Astronomer.

(*Communicated by Commander J. M. Gilliss.*)

M.T. Washington.		Comet — Star. Δ R.A.	Δ Decl.	Comet's Apparent R.A.	Decl.
1861	h m s	m s	′ ″	h m s	° ′ ″
July 2	9 55 19·3	+ 0 38·84	+ 5 58·79	8 43 6·97	+63 12 14·65
3	8 46 46·3	+12 12·30	− 4 22·69	9 51 41·15	66 9 52·46
„	9 10 7·3	+ 4 7·69	+11 36·35	9 52 52·55	66 11 36·73
4	8 51 20·5	+ 1 17·95	+16 51·38	10 58 36·26	66 54 20·63
6	9 0 52·5	+ 5 28·25	+19 35·73	12 31 12·57	64 51 7·59
8	8 51 54·0	− 1 8·74	− 6 34·76	13 20 47·48	61 50 8·93
12	10 10 53·1	− 1 40·65	+ 0 5·69	14 7 35·00	56 58 13·53
14	10 23 52·0	+ 5 23·97	−15 15·40	14 19 45·09	55 14 25·87
16	9 10 58·8	− 0 36·04	+21 37·52	14 28 23·77	53 52 7·76
17	8 29 29·1	− 4 30·63	+15 1·99	14 31 53·61	53 16 40·10
20	9 55 15·2	− 4 26·76	−14 35·12	14 40 37·21	51 42 28·91
23	9 1 48·1	− 4 50·84	+18 25·42	14 46 58·13	50 30 18·35
24	8 32 46·4	− 3 3·55	− 2 24·53	14 48 45·39	50 9 28·30
25	8 50 54·5	− 0 51·32	+10 36·52	14 50 29·23	49 49 16·30
27	9 0 37·5	+ 1 8·24	+15 31·25	14 53 38·04	49 12 26·44
30	8 27 55·7	− 1 29·14	+12 59·41	14 57 45·86	48 24 42·34
Aug. 1	8 42 5·6	− 1 4·48	−15 37·36	15 0 19·43	47 56 5·37
4	8 48 54·9	− 2 18·08	− 4 55·72	15 3 52·88	47 17 34·70
6	8 46 10·2	+ 2 5·21	− 6 16·41	15 6 8·52	46 54 17·26
15	8 15 7·3	+ 1 56·99	− 4 52·68	15 15 53·75	+45 26 27·12

1861	No. of Comp.	Comp. Star.
July 2	10	A.Z.N. 187·74
3	2	2396 Radcliffe.
,,	5	A.Z.N. 176·26.
4	12	,, 176·13.
6	4	,, 186·96.
8	9	,, 203·66.
12	5	* ,, 109·92.
14	5	,, 5·8.
16	10	4760 Rümker.
17	3	Star 11.
July 20	5	1668 Cat. Gen.
23	7	†3293 Radcliffe.
24	10	,, ,,
25	11	A.Z.N. 2·22.
27	7	,, 2·23.
30	7	2317 Radcliffe.
Aug. 1	10	,, ,,
4	6	‡1697 Cat. Gen.
6	5	§A.Z.N. 118·8.
15	7	,, 118·21.

Mean places for 1860·0 of Comparison Stars.

		R.A. h m s	Decl. ° ′ ″	
A.Z.N. 187,74	8·5	8 42 21·24	+63 6 30·15	Arg. Northern Zones.
2396 Radcliffe	6	9 39 22·18	66 14 32·14	Radcliffe Cat.
A.Z.N. 176,26	9	9 48 38·30	66 0 17·90	Arg. Northern Zones.
,, 176,113	7	10 57 12·41	66 37 48·72	,, ,,
,, 186,96	8	12 25 39·35	64 31 51·80	Argel. N.Z. and Rümker.
,, 203,66	9	13 21 51·68	61 57 2·60	Arg. Northern Zones.
* ,, 109,92	9	14 9 11·57	56 58 24·56	,, ,,
,, 5,8	7	14 14 17·03	55 30 33·18	Argel. N.Z. and Rümker.
4760 Rümker	7	14 28 55·39	53 30 47·85	Rümker's Cat.
Star 11	10	14 36 19·83	53 1 55·85	W. Equat. from A.Z.N. 1,39
1668 Str. Cat. G.	6	14 44 59·58	51 57 21·05	Struve Cat. G. and Rümker.
†3293 Radcliffe	5	14 51 44·56	50 12 10·09	Radcliffe and A.Z.N.
A.Z.N. 2,22	9	14 51 16·09	49 38 57·32	Arg. Northern Zone.
,, 2,23	7	14 52 25·45	48 57 13·00	,, ,,
3317 Radcliffe	7	14 59 10·68	48 12 0·57	Radcliffe Cat.
‡1697 Str. Cat. G. pr.	9	15 6 6·72	47 22 48·11	Struve and A.Z.N.
§A.Z.N. 118,8	8	15 3 59·12	47 0 51·96	Arg. Northern Zones.
,, 118,21	7	15 13 52·55	+45 31 38·45	Argel. N.Z. and Rümker.

* The mean of 92 and 94 is used.

† This star is 4937 B.A.C. The mean of 3293 Radcliffe, and A.Z.N. 2,24 is used, without correcting for proper motion.

‡ The determination of 1697 Struve is of the sequent star, which is the same as A.Z.N. 118·9, but in the latter determination the declination is 10 minutes too small. It is also 4981 Rümker, who probably observed the preceding star. I have used a mean of Struve and Argelander for the sequent star, and applied the present observed differences for the place of the preceding star, which was used in the comparison.

§ The mean of 118,8 and 113,90 is used.

Mr. Francis Abbott, in a letter dated Hobart Town, June 22, 1861, addressed to Mr. Carrington, incloses a printed letter, giving an account of the same Comet II., 1861, as seen at Hobart Town, as follows:—

"*To the Editor of the Mercury.*

"Sir,—A notice was given in your issue of the 7th instant of a remarkably fine Comet, first seen at Hobart Town on the morning of the 4th, and at present appearing every clear morning in the south-eastern hemisphere, and in the evening near the south-western horizon. From its slow motion and general appearance it may continue for some time to be an object of interest in the southern sky. The comet's position first noticed was in the constellation *Eridanus*, the nucleus lying a little to south of a small star marked 315 a. lc.; it proceeded a little south of 01 and 02, passing between them and 358, all stars of the 6th magnitude. The tail, which is quite straight and about 10 degrees in length, points in the direction of the star *Achernar*, the nucleus forming nearly a right angle with that star and *Canopus*. The nucleus of the comet, measured with a Cavallo's micrometer in an eye-piece of 50, was 33″ in diameter; the coma or nebulosity surrounding the nucleus, as seen with a comet eye-piece of 27 in a 5-feet telescope, was 30 minutes in diameter. The breadth of nebulosity at the apex of the tail 50 minutes, where it becomes very diffuse.

"The approximate positions of the comet, taken every clear morning to the present date, are as follows:—

1861.	Hobart Town M.T. h m	Comet's App. R.A. h m	Comet's App. Decl. ° ′
June 6	4 30 A.M.	4 2	30 20 S.
7	5 40	4 4	29 40
12	4 50	4 14	27 45
16	4 30	4 22	26 30
17	5 40	4 24	26 30
18	5 15	4 26	25 20
19	5 45	4 30	24 0
20	4 50	4 34	23 30

"The comet is very like to the second comet of 1819, which was discovered by Professor Trallis at Berlin, July 1st, and made its appearance suddenly above the N.W. horizon, in the constellation *Lynx*; it was visible to the naked eye, with a bright tail and nucleus, until October 20th.

"Francis Abbott.

"*Murray Street, June 20th*, 1861."

Mr. Abbott remarks, however, that the right ascension and declination must only be considered approximate, as a few days before the comet appeared he sent his equatoreal and azimuth instruments to Melbourne.

On the Form of the Shadow of Saturn's Ring.
By the Rev. T. W. Webb.

The following extract from the *Commentaries of the Royal Society of Sciences at Göttingen*, for the years 1791 and 1792, as published in this country in the *Memoirs of Science and the Arts*, may possibly be worthy of attention, in connexion with Mr. De La Rue and Mr. Lassell's very interesting observations of the irregular form of the shadow of the ring upon the globe of *Saturn*. It occurs in a description of the 13-feet reflector, by Schräder, of which Schröter made such extensive use, and which seems to have been an excellent instrument:—

"On the 26th of December, 1792, the writer (Schröter) observed *Saturn* with power about 300, and saw his belts, the southern broad, like a cloud, the nearest northern much more lucid than the remaining part of the surface, and the shadows which the body cast upon the ring and the ring upon the body. The boundaries of these shadows were jagged."

The irregularity of the shadow, as projected upon the ring, may possibly have been the deviation, so often remarked, where it crosses the principal division. The indentations of the shadow upon the globe may, perhaps, be thought analogous to those recently noticed; but in the case of Schröter's observation, though I have no means at hand of ascertaining the form of the ring in 1792, it is evident that it must have been much more open than at present, as otherwise the outline of the shadow projected upon it could not have been discernible.

Hardwick Parsonage, July 27, 1861.

Occultations of Stars by the Moon, observed at Forest Lodge, Maresfield, Sussex. By Capt. W. Noble.

Friday, June 14, 1861.

36 Sextantis.

The star disappeared instantaneously
at $14^h\ 18^m\ 45^s{\cdot}8$ L.S.T. = $8^h\ 46^m\ 15^s{\cdot}98$ L.M.T.

A dense haze of cirri prevented the observation of the reappearance. There was a great deal of atmospheric disturbance.

Tuesday, June 25.

18 Aquarii.

A thick haze surrounding the Moon deprived me of any chance of seeing the disappearance.

The star reappeared instantaneously
at $18^h\ 30^m\ 27^s{\cdot}3$ L.S.T. = $12^h\ 14^m\ 1^s{\cdot}2$ L.M.T.

π Capricorni.

	h	m	s		h	m	s	
The star disappeared instantaneously at	19	39	6·2	L.S.T. =	8	4	0·2	L.M.T.
and reappeared at	20	49	1·7	L.S.T. =	9	13	59·5	L.M.T.

Saturday, September 14.

ϱ Capricorni.

The star disappeared instantaneously
at $20^h\ 53^m\ 12^s{\cdot}8$ L.S.T. = $9^h\ 17^m\ 54^s{\cdot}6$ L.M.T.

The reappearance was not observed. The atmospheric tremor was great. In all these observations my 4·2 inch equatoreal was employed, in each case with a power of 115 adjusted on the respective stars.

Captain Noble, in the letter which accompanied the foregoing observations, mentions as a curious fact that on Sunday evening, the 16th of June, while experimenting with the Hodgson eye-piece, upon lunar detail, he was surprised and amused to find that with powers of 160 and upwards the effect presented was a pseudoscopic one. The appearances of the Apennines as a deep and irregular depression in the Moon's surface, and that of the craters as large blisters, was, so to speak, absurd. Steady gazing caused this illusion to disappear, only to reappear again however after a short interval.

Occultation of Stars by the Moon, observed at the Dudley Observatory, Albany, U.S.A. By G. W. Hough, Assistant.

(*Communicated by Professor Mitchell through the Astronomer Royal.*)

		h	m	s	
ϱ Capricorni,	Immersion, July 21,	23	18	28·1	Sid. Time.
16 Piscium,	Immersion, July 25,	20	11	2·2	,,

ϱ Capricorni, probably $0^s{\cdot}2$ slow.

16 Piscium: star seemed to hang on the edge of the Moon about $0^s{\cdot}5$ before it disappeared.

Observations of Leto and Virginia, with the Equatoreal, at the United States Naval Observatory, Washington. By Mr. James Ferguson, Assistant Astronomer.

(*Communicated by Commander J. M. Gilliss.*)

Leto (68).

M.T. Washington.	(68) — Star. R.A.	(68) — Star. Decl.	(68), Apparent R.A.	(68), Apparent Decl.
1861	h m s	′ ″	h m s	° ′ ″
June 13	9 39 4·7	−0 15·87	− 4 56·57	13 42 13·97	−10 24 12·11
14	8 58 28·3	−0 24·47	− 6 13·71	13 42 5·36	10 25 29·21
18	8 54 48·8	−0 45·47	+12 33·43	13 41 44·00	10 31 48·85

	No. of Comp.	Comp. Star.
1861, June 13	3	Weisse, XIII. 725
14	4	,,
18	3	,,

Mean place for 1860·0 of Weisse XIII. 725.

Mag.	R.A.	Decl.
9·5	$13^h\ 42^m\ 23^s{\cdot}48$	$-10^\circ\ 18'\ 38''{\cdot}52$

Virginia ◯.

M.T. Washington.	(60) — Star. R.A.	(60) — Star. Decl.	(50), Apparent R.A.	(50), Apparent Decl.
1861	m s	′ ″	h m s	° ′ ″
July 25	10 9 9·6	+1 0·79	−17 22·67	20 7 48·90	−16 2 27·49
Aug. 1	9 48 58·8	+3 51·51	+15 45·21	20 1 23·29	16 30 1·33
2	9 24 19·4	+2 58·77	+11 48·75	20 0 30·46	16 33 57·93
3	10 3 26·5	+2 3·88	+ 7 40·06	19 59 35·62	16 38 6·78
4	9 42 34·0	+1 11·95	+ 3 40·15	19 58 43·70	16 42 6·86
6	9 37 31·2	−0 30·58	− 4 20·60	19 57 1·17	16 50 7·95

	No. of Comp.	Comp. Star.
1861, July 25	8	A.C. 20337
Aug. 1	10	,, 20217
2	14	,, ,,
3	11	,, ,,
4	12	,, ,,
6	11	,, ,,

Mean places for 1860·0 of Comparison Stars.

	Mag.	R.A.	Decl.	Authority.
		h m s	° ′ ″	
A.C. 20337	9	20 6 40·13	−15 45 19·22	Argelander's Catalogue Southern Zones.
,, 20217	7·8	19 57 23·70	16 45 58·10	

Mr. Ferguson, the discoverer of the planet (60) hitherto called *Titania*, has written to Mr. Hind, stating that this name was proposed without remarking its previous appropriation by Sir John Herschel for one of the satellites of *Uranus*, and intimating his intention to change it forthwith for *Echo*. This name will appear in the *Nautical Almanac* for 1865.

Discovery of a New Minor Planet, Niobe (71).

The planet was seen by Dr. Luther, as a star of the 11th mag., about 11 in the evening of the 13th August, R.A. 334° 52′, Decl. 0° 7′. On the following evening it was observed as follows :—

	Bilk M.T.	R.A.	Decl.	
1861, Aug. 14	$14^d\ 13^h\ 12^m\ 38^s{\cdot}4$	334° 34′ 58″·3	−0° 4′ 41″·5	10 Comp. with $*\ a$.

the daily motion being, therefore,

−16′	+2′

The comparison-star a (7, 8) was, according to a new determination by Prof. Argelander, at Bonn, assumed as follows :—

	Apparent		Mean Position, 1861, 0.	
	R.A.	Decl.	R.A.	Decl.
1861, Aug. 14	334° 6′ 17″·2	−0° 5′ 10″·4	334° 5′ 13″·4	−0° 5′ 33″·5 ;

and hence the position of B. Z. 34, required the correction,

R.A.	Decl.
−4″·6 (in arc)	−0″·5

The following observations were taken at Bonn by Prof. Wolf :—

	Bonn M.T.	R.A.	Decl.
	h m s	h m s	° ′
1861, Aug. 15	11 51 22·7	22 17 21·07	−0 2·5
	12 37 2·9	22 17 18·49	−0 2 37″·4

Apparent Position of Star a.

Aug. 15	$22^h\ 16^m\ 25^s{\cdot}16$	−0° 5′ 10″·25

The planet was also observed by Prof. Schönfeld, at Mannheim, as follows :—

	Mannheim M.T.	R.A.	Decl.
1861, Aug. 17	$10^h\ 50^m\ 59^s$	$22^h\ 15^m\ 15^s{\cdot}52$	+0° 1′ 4″·0

The foregoing account is calculated from the *Astron. Nach.*, No. 1323. Several later observations are published in subsequent Numbers.

Re-Discovery of Pseudo-Daphne (56).

M. Goldschmidt announces (*Astron. Nach.*, No. 1325) that, after a search of thirteen months, he has succeeded, August 27, in again finding this planet. This result is owing to the ephemeris of Dr. Luther and the Star-map, hora xx., of Dr. Hencke. The planet was of the 10-11 magnitude, and its position for August 28 was

	Paris M.T. (?)	R.A.	Decl.
Aug. 28	$10^h\ 17^m$	$20^h\ 25^m\ 56^s$	$-6°\ 48'·5$

obtained by comparison with the star Lalande 39626 (8-9 mag).

Dr. Luther gives, in the same number, a new set of approximate (ganz flüchtig entworfene) elements, computed to connect the observations of 1857 and 1861, and to show that the planet is distinct from *Daphne*.

Pseudo-Daphne (56), *Elements III.*

Epoch 1857, Sept. $13^h·0$ Berlin.

M	=	36° 9'·5	
π	=	294 40·6	Mean Equinox, 1861, 0.
Ω	=	194 39·5	
i	=	8 3·5	
φ	=	13 7·6	
μ	=	846″·72	

The Editor has received a communication from the Astronomer Royal as follows:—

"In a paper of official character, written by Lieutenant-General Bäyer, Director of the Prussian Geodetic Survey, and circulated by the Prussian Government among the principal Governments of Europe, the following passage occurs:—

"'Bessel hatt in Jahre 1841 aus 10 Breitengrad-Messungen die Abplattung $\frac{1}{299·15}$, den Aequatorial-radius = 372077 Toisen bestimmt, Airy fand 8 Jahre später, aus 14 Breiten- und 4 Längen-grad Messungen, die Abplattung = $\frac{1}{299·33}$ und den Aequatorial-radius = 3272120 Toisen.'

"That is to say, Bessel's investigations on the Figure of the Earth were made in 1841, and mine 8 years later, or in 1849.

"My investigations were made long before Bessel's. They are contained in an elaborate article on the 'Figure of the

Earth,' in the *Encyclopædia Metropolitana*. In the printed book, the paper is dated at the end 'August 17, 1830.'

"I do not indicate this error in any spirit of complaint against General Bäyer, whose honourable character is perfectly appreciated in this country. But it is an instance proving that the progress of science in Britain is little known on the Continent; and that a historian of science, in order to avoid error, must carefully examine the literature of the country in which each scientific author has lived and has written."

Mr. Andrew Lang, who (as he mentions in his letter) has been a Fellow of the Society since 1821, and is 82 years of age, has sent an account of the Solar Spots observed by him in the Island of St. Croix, in the West Indies, during the year 1860. The observations were always made in the morning, from 7 to 8 o'clock, with an inverting eyepiece, magnifying 40 times, by Gilbert, applied to a telescope 44 inches focal length and $3\frac{1}{3}$ inches clear aperture, by Banks. Mr. Lang writes that he has in vain looked for *Vulcan*.

In the *Comptes Rendus*, 3 June, 1861, M. Le Verrier announces the completion of his researches on the motion of the planet *Mars*, and he considers the consequences, in regard to the physical constitution of the Solar System, which are to be derived therefrom in connexion with his former researches on the motions of *Mercury*, *Venus*, and the Earth. The theories of *Venus* and *Mars* agree in showing, that in order to obtain from theory the actual motions of the perihelia of these planets it is necessary to increase by about one-tenth part the mass of the Earth; but the actual motion of the perihelion of *Mercury* cannot be accounted for by means of this change; and as the received mass of *Venus* could not be altered, M. Le Verrier was thus led to conclude the existence of a ring of intra-mercurial masses. A group of asteroids exists as we know between *Jupiter* and *Mars*, and there is reason to believe that there are circulating round the Sun, in planetary space, a large number of very small bodies; as regards the region in the neighbourhood of the Earth's orbit this is certain. Thus, without the above-mentioned alteration in the mass of the Earth, M. Le Verrier obtains with respect to the constitution of the inferior part of our planetary system as deduced from the discussion of the observations, the following conclusions:—

1°. Besides the planets *Mercury*, *Venus*, the Earth, and

Mars, there exists between the Sun and *Mercury* a ring of asteroids, the aggregate of which constitutes a mass comparable to that of *Mercury*.

2°. At the distance of the Earth from the Sun there is a second ring of asteroids, the mass of which is at most equal to a tenth part of the mass of the Earth.

3°. The total mass of the asteroids between *Mars* and *Jupiter* is at most equal to one-third of the mass of the Earth.

4°. The masses of the last two groups are complementary to each other; ten times the mass of the group situate at the distance of the Earth, plus three times the mass of the group situate between *Mars* and *Jupiter*, gives a sum equal to the mass of the Earth.

This last conclusion depends on the measure of the distance of the Earth from the Sun by the observation of the transits of *Venus*, which astronomers agree in considering as very precise.

INSTRUMENTS AND BOOKS FOR SALE.

The family of the late E. J. Burrow, D.D., Archdeacon of Gibraltar, are desirous of disposing by sale of his astronomical instruments and books, namely:—

1. A best constructed $3\frac{1}{4}$-feet achromatic telescope, with $3\frac{1}{4}$-inches object-glass, achromatic finder, sliding steadies, 6 eye-pieces, powers from 40 up to 200, a ring, and a wire micrometer with accommodation metal (adapted to all the eye-pieces) and 4 eye-pieces in white metal, powers from 70 to 180. The tube, in brass, is fitted to a strongly mounted and newly constructed $8\frac{1}{2}$-inch equatoreal, with 3 spirit-levels, strong upright supports, metal axis, graduated declination arc, with clamps, &c., and azimuth and hour-circle plates, and 2 sets of verniers reading off to 12 seconds of time and one minute of space.

The instrument was made by Jones of Holborn, in August 1854, without regard to cost, and is in a high state of preservation. It is now placed for inspection under the care of Mr. J. Williams, the Assistant Secretary, at Somerset House, who is authorized to exhibit the bills of sale, and to treat with any party wishing to become a purchaser.

2. A journeyman clock, striking minutes and half-minutes. Also,

3. A set of "Pearson's Astronomy," 2 vols., and a vol. of Plates, large 4to. boards, and

4. Baily's Catalogue of Stars of the British Association.

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